CLAIMS:

1. A compound having a bridge complex satisfying the following conditions:

(1) at least two central metal atoms;

(2) at least one first multidentate ligand forming a bridge between two central metal atoms; and

(3) at least one second multidentate ligand having at least one coordinating atom that can be coordinated with a metal atom, but which is not coordinated or only partially coordinated with the central metal atoms.

2. A compound as in claim 1, wherein the central metal atoms are selected from the group consisting of zinc, manganese, iron, molybdenum, tin, antimony and copper.

3. A compound as in claim 2, wherein the at least one coordinating atom contained in the first multidentate ligand is oxygen.

4. A compound as in claim 3, wherein the first multidentate ligand is selected from the group consisting of an inorganic acid, an organic acid, and salts thereof, and wherein the first multidentate ligand contains an oxygen atom derived from a hydroxyl group, carboxyl group, or carbonyl group, said oxygen atom coordinating with at least one of the central metal atoms.

5. A compound as in claim 4, further including a third multidentate ligand that comprises at least one sulfur atom that is coordinated with at least one of the central metal atoms.

6. A compound as in claim 5, wherein the second multidentate ligand comprises an oxygen atom as the coordinating atom.

7. A compound as in claim 6, wherein the second multidentate ligand is selected from the group consisting of an inorganic acid, an organic acid, an amine compound, derivatives thereof, and salts thereof, wherein the second multidentate ligand contains a hydroxyl group, carboxyl group, or carbonyl group having a coordinating oxygen atom.

8. A compound as in claim 1, wherein the at least one coordinating atom contained in the first multidentate ligand is oxygen.

9. A compound as in claim 1, wherein the first multidentate ligand is selected from the group consisting of an inorganic acid, an organic acid, and salts thereof, and wherein the first multidentate ligand contains an oxygen atom derived from a hydroxyl group, carboxyl group, or carbonyl group, said oxygen atom coordinating with at least one of the central metal atoms.

10. A compound as in claim 1, further including a third multidentate ligand that comprises at least one sulfur atom that is coordinated with at least one of the central metal atoms.

11. A compound as in claim 1, wherein the second multidentate ligand comprises an oxygen atom as the coordinating atom.

12. A compound as in claim 1, wherein the second multidentate ligand is selected from the group consisting of an inorganic acid, an organic acid, an amine compound, derivatives thereof, and salts thereof, wherein the second multidentate ligand contains a hydroxyl group, carboxyl group, or carbonyl group having a coordinating oxygen atom.

13. A lubricating liquid comprising the compound of claim 1 as a main lubricating agent dispersed or suspended in a substantially aqueous solution.

14. A lubricating liquid as in claim 13, further comprising a surfactant.

15. A method of forming a lubricating film on a metal surface comprising contacting the lubricating liquid of claim 14 with the metal surface.

16. A method as in claim 15, wherein the at least two central atoms of the main lubricating agent are zinc.

17. A lubricating liquid comprising the compound of claim 7 as a main lubricating agent dispersed or suspended in a substantially aqueous solution.

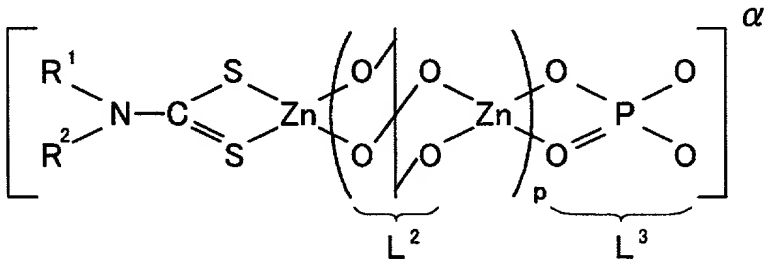
18. A lubricating liquid as in claim 17, further comprising a surfactant.

19. A method of forming a lubricating film on a metal surface comprising contacting the lubricating liquid of claim 18 with the metal surface.

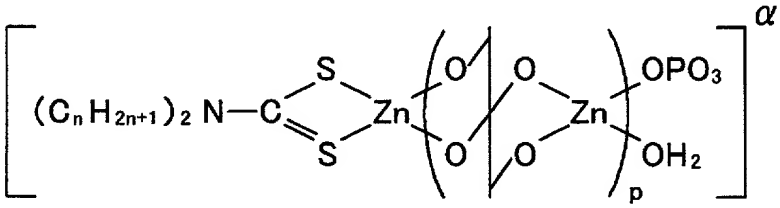
20. A method as in claim 19, wherein the at least two central atoms of the main lubricating agent are zinc.

21. A compound as in claim 1 selected from the group consisting of the following formulas 16-34, 37, 38, 40 and salts thereof:

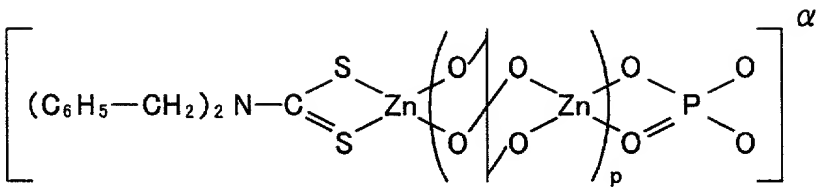
[Formula 16]



[Formula 17]



[Formula 18]



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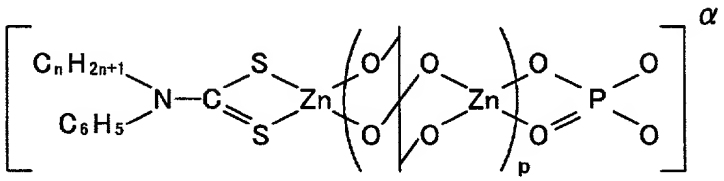

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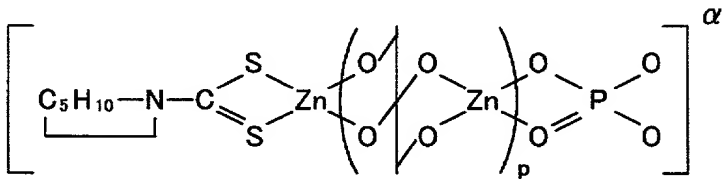

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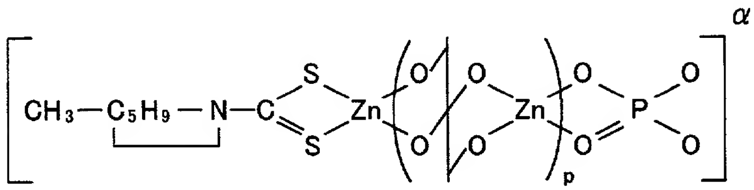

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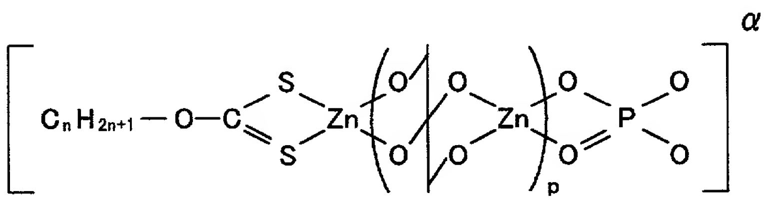

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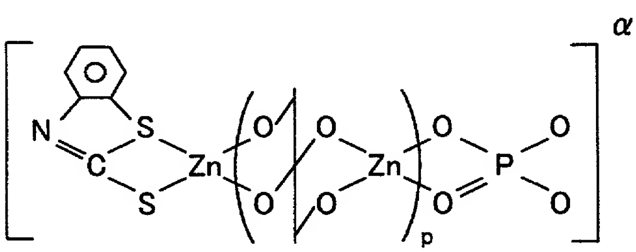

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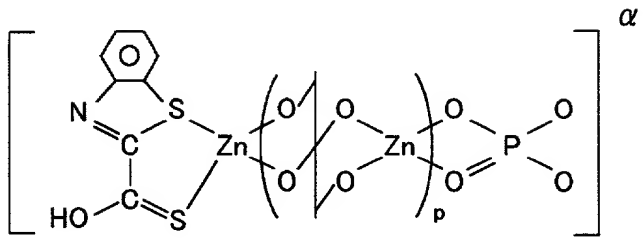

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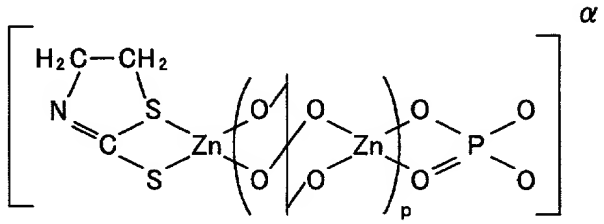

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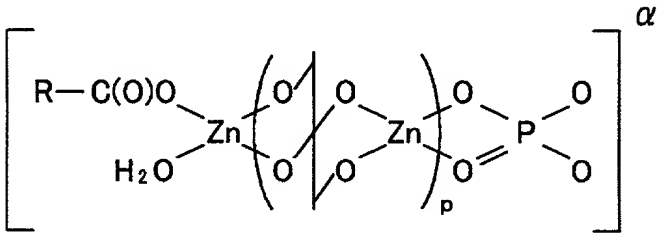

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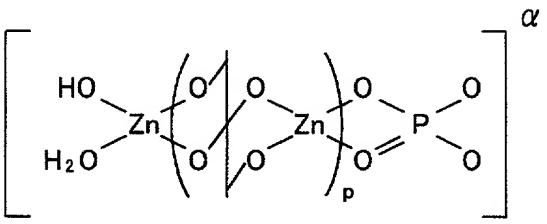

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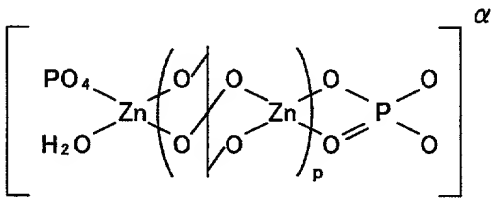

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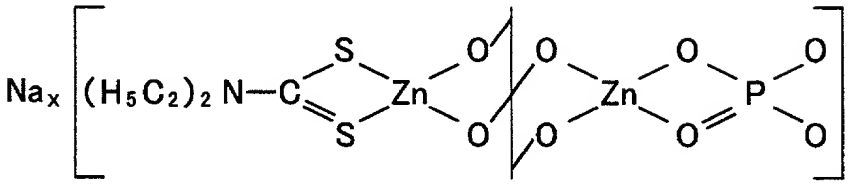

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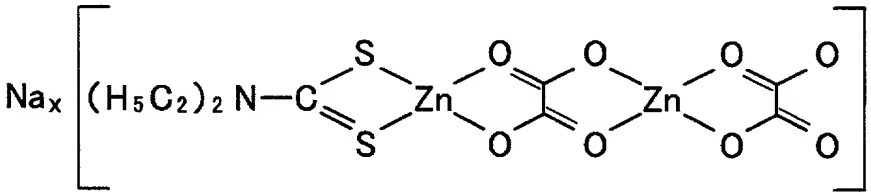

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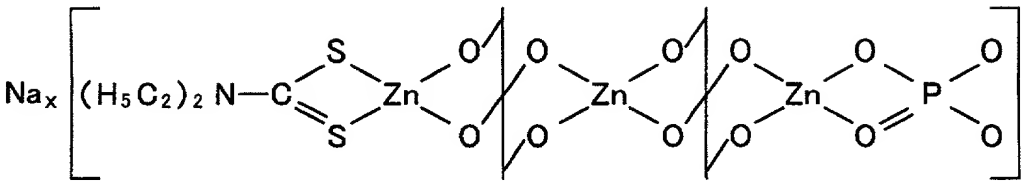
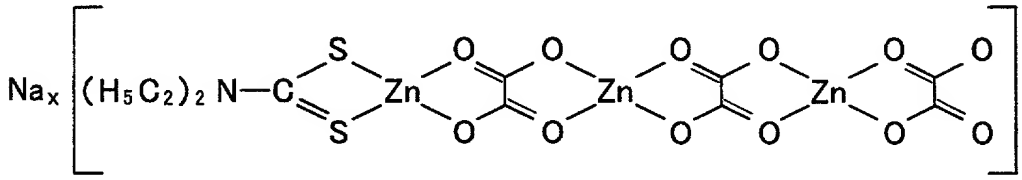
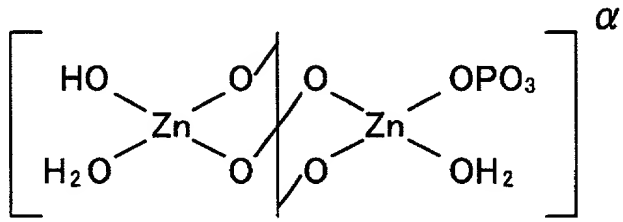


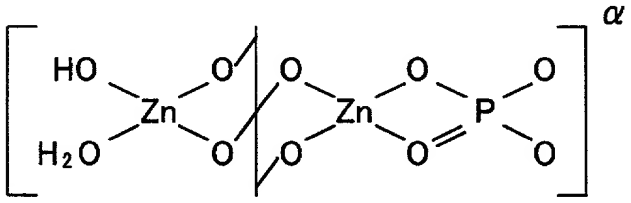
[Formula 32]



[Formula 33]



[Formula 34]



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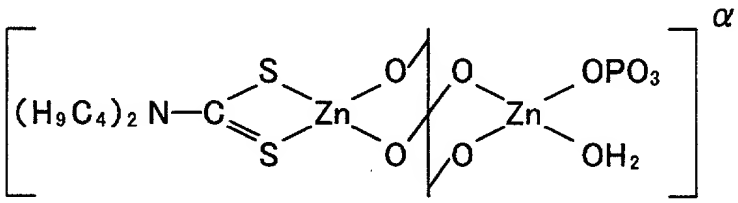

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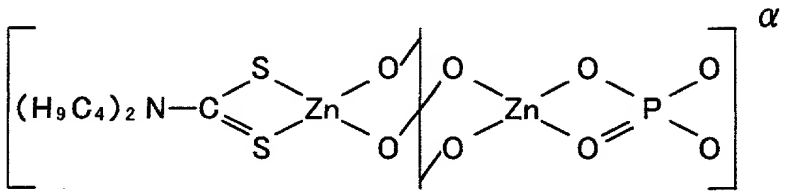
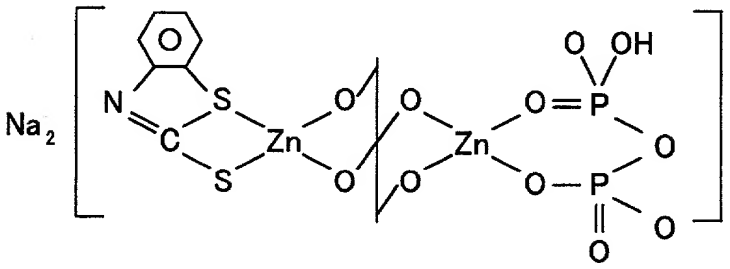


and

[Formula 40]



wherein R, R^1, and R^2 are independently selected from the group consisting of C_{1-12} alkyl groups, alkenyl groups, acyl groups, and aryl groups and x is an integer between 1 and 4.

22. A compound as in claim 21, wherein the compound is negatively charged and the negative charge is balanced by at least one alkali metal ion or at least one alkali earth metal ion.

23. A compound as in claim 22, wherein the compound is selected from the group consisting of formulas 16-20, 22, 23, 25 and 26.

24. A compound as in claim 23, wherein the negative charge of the compound is balanced by at least one sodium ion.

25. A compound as in claim 1, wherein the at least two central metal ions are first and second zinc ions, the first multidentate ligand is a triphosphate group that forms a bridge between the first and second zinc ions, the second multidentate ligand is a phosphate group, in which two oxygen atoms of the phosphate group are bound to the second zinc ion and a third multidentate ligand comprises at least two sulfur atoms or at least two oxygen atoms, in which two sulfur atoms or two oxygen atoms of the third multidentate ligand are bound to the first zinc ion.

26. A compound as in claim 25, wherein the third multidentate ligand is a dithiocarbamato group.

27. A compound as in claim 25, wherein the third multidentate ligand is selected from the group consisting of dimethyl dithiocarbamato, diethyl dithiocarbamato, dipropyl dithiocarbamato, dibutyl dithiocarbamato, methyl benzyl dithiocarbamato, ethyl benzyl dithiocarbamato, propyl benzyl dithiocarbamato, butyl benzyl dithiocarbamato, dibenzyl dithiocarbamato, methyl phenyl dithiocarbamato, ethyl phenyl dithiocarbamato, propyl phenyl dithiocarbamato, butyl phenyl dithiocarbamato, di phenyl dithiocarbamato, cyclopentamethylene dithiocarbamato, ethylxanthogenato, 2-mercaptothiazolinato, 2-mercaptobenzothiazolato and stearao-aqua.

28. A compound having the formula:

$$Y_m[(A)_xM(B_nM)_pC_z]^q$$

wherein:

Y is selected from the group consisting of alkali metal ions and alkali earth metal ions;

M is selected from the group consisting of zinc, manganese, iron, molybdenum, tin, antimony, and copper;

A is selected from the group consisting of dimethyl dithiocarbamato, diethyl dithiocarbamato, dipropyl dithiocarbamato, dibutyl dithiocarbamato, methyl benzyl dithiocarbamato, ethyl benzyl dithiocarbamato, propyl benzyl dithiocarbamato, butyl benzyl dithiocarbamato, dibenzyl dithiocarbamato, methyl phenyl dithiocarbamato, ethyl phenyl dithiocarbamato, propyl phenyl dithiocarbamato, butyl phenyl dithiocarbamato, diphenyl dithiocarbamato, cyclopentamethylene dithiocarbamato, ethylxanthogenato, 2-mercaptothiazolinato, 2-mercaptobenzothiazolato and stearao-aqua;

B is selected from the group consisting of polyphosphoric acids, keto-form or enol-form of oxalacetic acid, keto-form or enol-form of oxalosuccinic acid, a hydroxyacid, gluconic acid, oxalic acid, derivatives and salts thereof;

C is selected from the group consisting of carboxylic acids, alkanolamines, amine derivatives, phosphoric acid, oxalic acid, polycarboxylic acids in which at least one hydrogen in at least one of the carboxyl groups is substituted an alkali metal cation and salts thereof;

n is an integer between 1 and 4;

x is an integer between 1 and 4;

p is an integer between 1 and 9;

z is an integer between 1 and 4;

q represents the valence of the bridge complex and

m is an integer between 0 and q, if Y is a single charged ion, m is an integer between 0 and q/2 if Y is a double charged ion and m is an integer between 0 and q/3 if Y is a triple charged ion.

29. A compound as in claim 28, wherein M is zinc.

30. A compound as in claim 29, wherein p is 1 and B is a tripolyphosphato group.

31. A compound as in claim 30, wherein C is a phosphato group.

32. A compound as in claim 31, wherein A is selected from the group consisting of diethyl dithiocarbamato, dibutyl dithiocarbamato, dibenzyl dithiocarbamato, ethyl phenyl dithiocarbamato, cyclopentamethylene dithiocarbamato, ethylxanthogenato, 2-mercaptothiazolinato, 2-mercaptobenzothiazolato and stearao-aqua.

33. A compound as in claim 31, wherein A is selected from the group consisting of diethyl dithiocarbamato, dibutyl dithiocarbamato, dibenzyl dithiocarbamato, ethyl phenyl dithiocarbamato, cyclopentamethylene dithiocarbamato, ethylxanthogenato, 2-mercaptothiazolinato and 2-mercaptobenzothiazolato.

34. A compound as in claim 28, wherein the compound is selected from the group consisting of sodium phosphato-diethyldithiocarbamato-μ-tripolyphosphato dizincate, sodium phosphato-aqua-diethyldithiocarbamato-μ-tripolyphosphato dizincate, sodium phosphato-

dibenzyldithiocarbamato-μ-tripolyphosphato dizincate, sodium phosphato-N-ethyl-N-phenyl-dithiocarbamato-μ-tripolyphosphato dizincate, sodium phosphato-cyclopentamethylene-dithiocarbamato-μ-tripolyphosphato dizincate, sodium phosphato-ethylxanthogenato-μ-tripolyphosphato dizincate, sodium phosphato-2-mercaptobenzothiazolato-μ-tripolyphosphato dizincate, sodium phosphato-2-mercaptothiazolinato-μ-tripolyphosphato dizincate and sodium phosphato-stearato-aqua-μ-tripolyphosphato dizincate.

35. A lubricating liquid comprising the compound of claim 34 as a main lubricating agent dispersed or suspended in a substantially aqueous solution.

36. A lubricating liquid as in claim 35, further comprising a surfactant.

37. A method of forming a lubricating film on a metal surface comprising contacting the lubricating liquid of claim 36 with the metal surface.

38. A lubricating liquid comprising the compound of claim 28 as a main lubricating agent dispersed or suspended in a substantially aqueous solution.

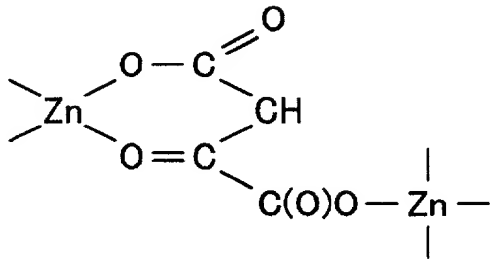
39. A lubricating liquid as in claim 38, further comprising a surfactant.

40. A method of forming a lubricating film on a metal surface comprising contacting the lubricating liquid of claim 39 with the metal surface.

41. A method as in claim 40, wherein M is zinc.

42. A compound selected from the group consisting of Formulas 2-10 and salts thereof:

[Formula 2]



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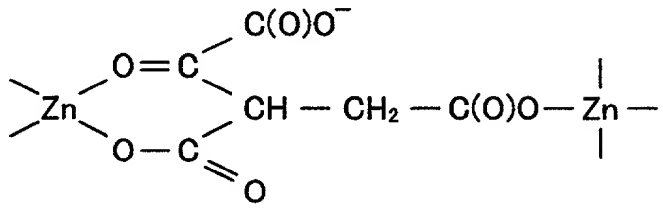

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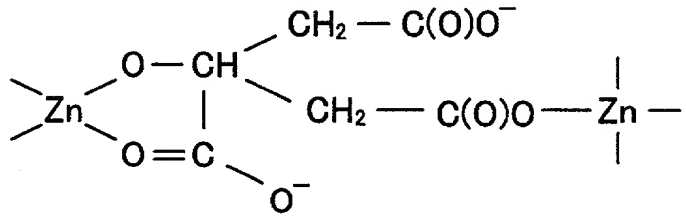

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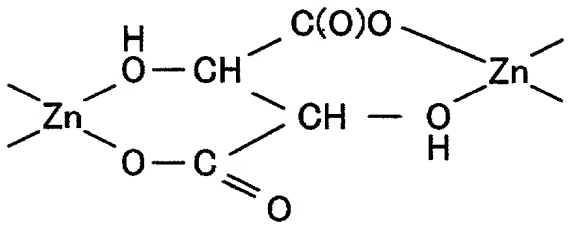

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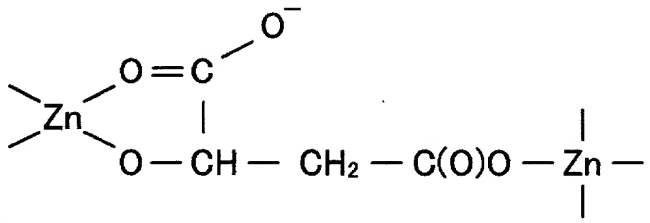

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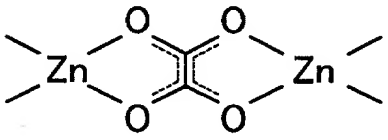

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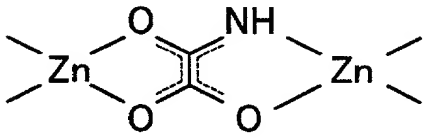

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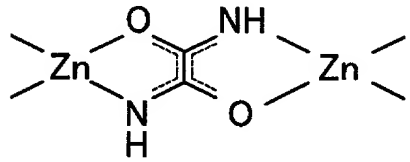

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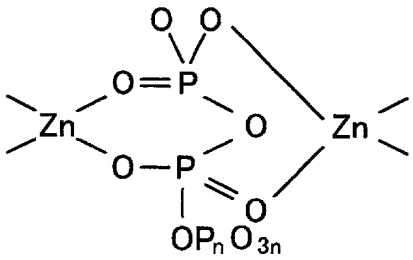

wherein the leftmost zinc atom in Formulas 2-10 is bound to a hydroxyl group, an aqua group, a carboxylic acid group, an ester or a dithiocarbamato group and the rightmost zinc atom in Formulas 2-10 is bound to at least one phosphate group, at least one aqua group or a phosphate group and an aqua group.

43. A compound as in claim 42, wherein the ester is –COOR and wherein R is a C_{1-10} alkyl group or a benzyl or phenyl group.

44. A compound as in claim 43, wherein the dithiocarbomato group is $S_2(CN)R_1R_2$ or S_2COR_1 and wherein R_1 and R_2 are independently C_{1-12} alkyl or C_{1-12} alkenyl or together form an aryl or acyl group.